

# Success Rates and their Related Factors in Patients Receiving Radioiodine (I-131) Treatment for Hyperthyroidism

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**Background and Objective:** The success rate of I-131 therapy for hyperthyroidism is dependent on several factors. The aim of the present study was to evaluate the success rates, and the factors which affected them, in patients with hyperthyroidism at Rajavithi Hospital who received I-131 therapy with doses based on thyroid gland weight (gram), clinical findings, and 3-hour radioiodine uptake (3-hr RAIU).

**Material and Method:** A retrospective study was performed of 305 hyperthyroid patients who received initial I-131 therapy at the Nuclear Medicine Department of Rajavithi Hospital, Bangkok between January 2010 and December 2014. Baseline characteristics, including thyroid gland weight (g), 3-hr RAIU, I-131 dose and all patient outcomes were reviewed. Success after initial I-131 therapy was defined as evidence of stable euthyroid or hypothyroid within 1 yr.

**Results:** A total of 305 hyperthyroid patients were enrolled. The mean (SD) age, gland weight, 3-hr RAIU, and I-131 dose were 44.17 (15.14) years, 51.19 (31.95) grams, 50.62% (24.36) and 14.40 (5.71) mCi. respectively. The success rate within 12 months was 66.3 %, and the factors associated with success were I-131 dose ( $p = 0.014$ ), gland size ( $p = 0.044$ ), 3-hr RAIU ( $p = 0.02$ ) and underlying cardiovascular disease ( $p = 0.014$ ).

**Conclusion:** The mean (SD) I-131 treatment dose was 14.4 (5.71) mCi., and the success rate within 1 year was 66.3%. I-131 therapy is an effective treatment for hyperthyroidism, and its rate of success rate depends on both patient factors and I-131 treatment dose.

**Keywords:** Hyperthyroidism, Radioactive iodine (I-131), 3-hour radioiodine uptake (3-hr RAIU), Success rate

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Hyperthyroidism is a common endocrine disorder caused by an excess of circulating thyroid hormone. The estimated prevalence rates of overt and subclinical hyperthyroidism are 0.5% and 0.7% respectively, and their incidence is higher in females than in males<sup>(1)</sup>. The most common cause of hyperthyroidism is Grave's disease which is an autoimmune condition associated with high levels of thyroid-stimulating immunoglobulin which lead to hyperthyroidism<sup>(2,3)</sup>. Other causes include hyperactive thyroid nodule either toxic multinodular goiter (MNG) or toxic adenoma<sup>(4)</sup>. The common signs and symptoms of hyperthyroidism include irritability, heat intolerance, palpitations, hyperactivity, increased sweating, hand tremor, weight loss, lid lag, tachycardia, muscle

weakness, frequent bowel movements and menstrual irregularities.

The aim of hyperthyroidism treatment is to reduce the thyroid hormone using antithyroid drugs (ATD), radioactive iodine (I-131) therapy or thyroidectomy. ATD therapy is the initial treatment of choice for uncomplicated Grave's disease in Thailand, Japan and Europe<sup>(5,6)</sup>. ATDs are highly effective in controlling the symptoms of hyperthyroidism; however, there is a high incidence of relapse after treatment is stopped. Surgical treatment in hyperthyroidism is reserved for unusual cases or patients who refuse I-131 therapy.

Therapeutic use of I-131 for hyperthyroidism was reported by Saul Hertz in 1941 and has become commonly accepted as the definitive therapy for hyperthyroidism because it is safe and cost-effective. Common indications of I-131 therapy for Grave's disease include recurrent hyperthyroidism, ATD therapy failure, ATD hypersensitivity or poor compliance<sup>(7)</sup>. I-131 is also the treatment of choice for

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toxic multinodular goiter and toxic adenoma. The rate of success of I-131 therapy, defined as either euthyroidism or hypothyroidism, varies and is dependent on both patient factors and dose selections. Generally, the factors that are known to affect clinical outcomes include I-131 dose, size of thyroid gland, thyroid uptake and gland sensitivity. There are two main techniques for determining I-131 treatment dose: fixed dose and calculated dose<sup>(8-13)</sup>. The former (5-15 millicuries (mCi)) is the general treatment, and the latter is used for individual patients based on thyroid gland weight and thyroid uptake measurement.

At Rajavithi Hospital, the treatment dose of I-131 for hyperthyroidism was applied based on estimated thyroid gland weight (gram) by physical examination and 100-200 microcuries ( $\mu$ Ci) /gram of thyroid gland depending on clinical findings and 3-hour radioiodine uptake (3-hr RAIU). The aim of the present study was to evaluate the success rates and prognostic factors among hyperthyroidism patients who received I-131 therapy based on this protocol.

#### **Material and Method**

A retrospective cohort study was conducted of 305 hyperthyroidism patients who received initial I-131 treatment at the Nuclear Medicine Department of Rajavithi Hospital, Bangkok, Thailand, between January 2010 and December 2014, with a follow-up period of at least 1 year after treatment.

Baseline characteristics including gender, age, BMI, diagnosis, ATD therapy, thyroid gland weight (g), 3-hr RAIU, I-131 treatment dose, underlying cardiovascular disease<sup>(14)</sup> and all patient outcomes were reviewed from medical records and laboratory data.

Thyroid status was evaluated by clinical findings and serum thyroid hormones (Electrochemoluminescence; ECL) and was defined as euthyroid (normal FT4, reference range 0.93-1.70 ng/dl and normal TSH, reference range 0.270-4.20 mIU/L), hypothyroid (low FT4 and elevated TSH) or persistent hyperthyroid (elevated FT4 and suppressed TSH). Success after initial I-131 therapy was defined as evidence of stable euthyroid or hypothyroid state without further I-131 or ATD therapy within 1 year. The present study was approved by the research ethics committee of Rajavithi Hospital (No. 170/2558). The protocol for I-131 hyperthyroidism therapy was as follows:

#### **Pre-treatment**

ATDs were discontinued for 7 days before I-131 therapy, and a low iodine diet for 1 week was

recommended. Female patients were encouraged to check for potential pregnancy with urine tests, and they were advised not to become pregnant for at least six months afterwards. All patients were exhorted to avoid unnecessarily exposing their family and the general public to radiation for 1 week.

#### **Treatment of I-131**

3-hr RAIU was measured with gamma spectrometer, Biodex Medical system (Atom Lab 930) and neck phantom on the morning of treatment day. The physician determined the treatment dose of I-131 applying the calculated dose method based on estimated thyroid gland size (g) by physical examination, 24-hr RAIU (70.0%), 100-200  $\mu$ Ci/g depending on the clinical findings and 3-hr RAIU. A higher dose (150-200  $\mu$ Ci) was preferred for patients who had low 3-hr RAIU, severe hyperthyroidism or underlying cardiovascular disease.

#### **Post treatment**

ATDs were resumed 3 days after I-131 therapy. Clinical examination and serum thyroid hormone (FT4 and TSH) measurement were performed routinely every 6-8 weeks of the follow-up period in order to evaluate thyroid status. A 3-6 months follow-up was recommended for patients who were clinically stable.

#### **Statistical analysis**

All analyses were performed using SPSS version 17.0. Data were presented as mean  $\pm$  standard deviation (SD), median (minimum-maximum) for continuous variables, and number (%) for categorical variables. The Kaplan-Meier method was used to generate survival curves and calculate 1-year success rates. The median time of success of treatment and 95% confidence intervals were calculated, and log-rank test was used to test for differences in success rates. A *p*-value of less than 0.05 was set for statistical significance for all of the tests.

#### **Results**

A total of 305 hyperthyroidism patients were recruited for this study. All patients received I-131 with a follow-up period of at least 1 year after treatment. The baseline demographics and I-131 doses are summarized in Table 1. Two hundred and forty-five (80.3%) patients were female, and the male to female ratio was therefore 1: 4. The mean (SD) age was 44.17 (15.14) years, gland weight mean (SD) was 51.19 (31.95) grams, and mean (SD) of 3-hr RAIU was 50.62% (24.36). All patients had

received ATD therapy, either propylthiouracil (42.9%) or methimazole (57.1%), before I-131 therapy was given. Grave's disease, MNG and toxic nodular goiter were diagnosed in 251 (82.3%), 48 (15.7%) and 6 (2.0%) cases respectively, and underlying cardiovascular disease was found in 44 (14.0%) cases. The mean (SD) I-131 dose was 14.40 (5.71) mCi. The cumulative success rates within 6, 12, 18 and 24 months were 46.0%, 66.3%, 75.2% and 82.7% respectively, as shown in Fig. 1. The median

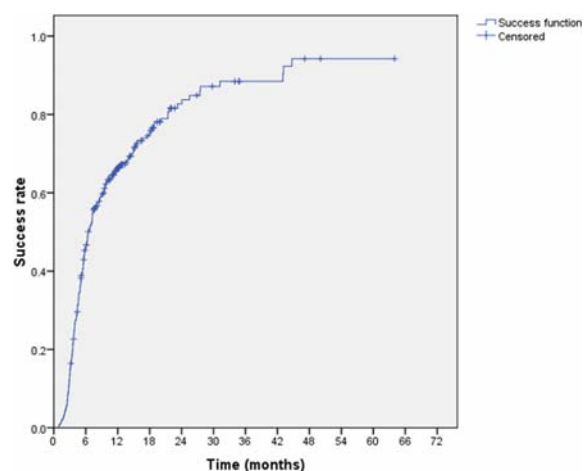
time of success was 6.47 months (5.61-7.32, 95% CI), and the mean follow-up time (min-max) was 23 (12-64) months. The prevalence of euthyroid within 1 year was 11.5% (35 cases). Nine patients (3.0%) became euthyroid after initial I-131 therapy for 1-2.3 years without requiring a second dose of I-131. Success rates showed a significant relationship with the I-131 dose ( $p = 0.014$ ), gland size ( $p = 0.044$ ), 3-hr thyroid uptake ( $p = 0.02$ ) and underlying cardiovascular disease ( $p = 0.014$ ). The success rates at 1 year for the groups with gland size of <30, 30-60, and >60 grams were 60.0%, 46.7% and 36.1% respectively, and details for the other groups are shown in Table 2 and Fig. 2-4. There was no significant relationship between success rates and age, gender, BMI, diagnosis or pre-treatment of ATD therapy ( $p > 0.05$ ). The formula for the mean I-131 treatment dose using linear regression based on gland size and 3-hr RAIU is  $I-131 = 0.256 \times \text{gland size} + (0.014 \times 3\text{-hr RAIU})$   $r^2 = 0.914$ . Four patients had transient hypothyroidism for 1, 1.5, 4 and 9 months before becoming hyperthyroid within 1 year. These patients were not included in the successful treatment group. Three patients were treated with 3 doses of I-131. One of these was a case of MNG with large thyroid gland (80 g), and the patient had to receive a total dose of 75 mCi. Persistent hyperthyroidism was noted in this patient until 32 months of follow-up. Another 2 patients were cured after the 3<sup>rd</sup> dose of I-131.

**Table 1.** Baseline characteristics (n = 305)

Characteristics	Number	Percentage
Gender		
Male	60	19.7
Female	245	80.3
Age (years)		
≤40	122	40.0
≥40	183	60.0
Mean ± SD (min-max)	44.17±15.14 (13 to 88)	
BMI (kg/m <sup>2</sup> )		
<18.5	36	11.8
18.5-24.9	187	61.3
25-29.9	60	19.7
≥30	22	7.2
Mean ± SD (min-max)	23.02±4.36 (13.55 to 43.26)	
Underlying disease		
No	261	85.6
Yes	44	14.4
Diagnosis		
Grave's disease	251	82.3
MNG	48	15.7
TNG	6	2.0
Antithyroid drug		
Metimazole	268	87.9
Propylthiouracil	37	12.1
Gland size (grams)		
<30	25	8.2
30-60	227	74.4
>60	53	17.4
Mean ± SD (min-max)	51.19±31.95 (20 to 350)	
3-hr RAIU (%)		
<20%	35	11.5
20-50%	120	39.3
>50%	150	49.2
Mean ± SD (min-max)	50.62±24.36 (6 to 95.5)	
I-131 dose (mci)		
<10	30	9.8
10-14	165	54.1
15-19	56	18.4
20-24	26	8.5
25-30	28	9.2
Mean ± SD (min-max)	14.40±5.71 (5 to 30)	

## Discussion

Hyperthyroidism should be suspected when clinical findings show evidence of abnormal thyroid hormone (elevated FT3, FT4 and depressed TSH) and/or high thyroid uptake. There are three treatment



**Fig. 1** The overall success rate.

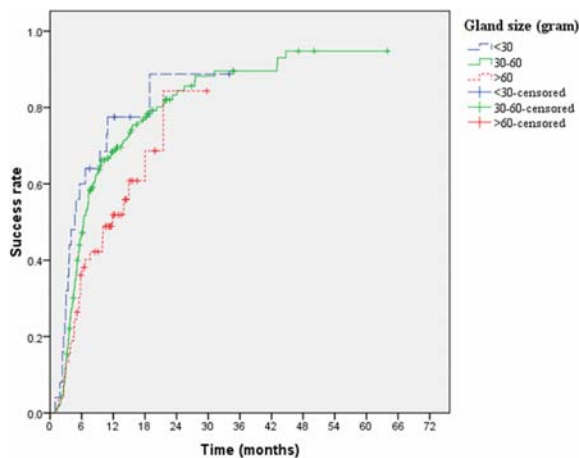
**Table 2.** The relationship between success rate and the variables

Characteristics	Success rate (%) within			Median ( 95% CI ) (months)	HR( 95% CI )	p-value
	Number	6 months	1 year	2 years		
Overall	305	46.0	66.3	82.7	6.47 (5.61 to 7.32)	
Gender						0.863
Female	245	44.5	66.4	84.5	6.80 (5.64 to 7.96)	
Male	60	52.2	65.9	74.8	5.63 (4.23 to 7.04)	
Age (years)						0.332
≥40	183	44.6	71.8	84.8	6.23 (5.19 to 7.27)	
≤40	122	48.0	57.5	80.7	7.27 (4.31 to 10.23)	
BMI (kg/m <sup>2</sup> )						0.940
18.5-24.9	187	44.3	66.2	82.0	6.70 (5.57 to 7.83)	
<18.5	36	55.6	73.9	84.0	5.10 (4.07 to 6.13)	
25-29.9	60	50.4	68.7	82.3	5.80 (3.43 to 8.17)	
≥30	22	32.5	73.6	87.9	9.23 (4.19 to 14.28)	
Underlying disease						0.014*
No	261	44.5	63.9	81.0	6.90 (5.63 to 8.16)	
Yes	44	54.5	79.5	91.8	5.60 (4.52 to 6.68)	
Diagnosis						0.905
Grave's disease	251	45.9	65.7	82.3	6.47 (5.55 to 7.39)	
MNG	48	47.9	68.6	79.8	6.10 (4.23 to 7.98)	
TNG	6	33.3	77.8	88.0	8.13 (0.00 to 18.39)	
Antithyroid drug						0.209
Methimazole	268	45.6	65.0	81.3	6.63 (5.74 to 7.53)	
Propylthiouracil	37	48.6	76.2	91.8	6.47 (3.38 to 9.56)	
Gland size (grams)						0.044*
30-60	227	46.7	68.4	83.2	6.37 (5.42 to 7.32)	
<30	25	60.0	77.5	80.8	4.70 (2.63 to 6.77)	
>60	53	36.1	51.9	84.3	11.83 (6.74 to 16.90)	
3-hour uptake (%)						0.026*
20-50	120	44.7	74.2	87.1	6.03 (5.20 to 6.86)	
<20	35	54.3	82.1	88.0	5.53 (4.34 to 6.73)	
>50	150	41.0	56.0	77.2	8.63 (5.52 to 11.75)	
I-131 dose (mci)						0.014*
10-14	165	52.6	74.0	87.2	5.60 (4.75 to 6.47)	
<10	30	47.7	55.2	71.6	10.93 (0.04 to 21.80)	
15-19	56	39.6	58.3	74.8	7.33 (4.60 to 10.07)	
20-24	26	42.3	76.0	88.0	6.63 (2.98 to 10.28)	
25-30	28	21.7	37.9	83.4	14.00 (6.74 to 21.26)	

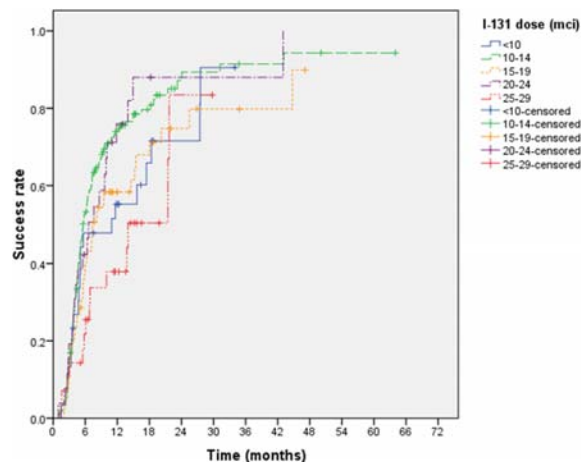
p-value from Log rank test, \* Significant at  $p < 0.05$

modalities which reduce the thyroid hormone: ATD therapy, I-131 therapy and thyroidectomy. The most common ATDs used are methimazole and propylthiouracil which can be used for Grave's disease on a short- or long-term basis. The former treatment aims to maintain normal thyroid hormone levels before a decision is made on what the definitive treatment should be. A 12-18 month period is usually required for long-term treatment; however, there is a high incidence

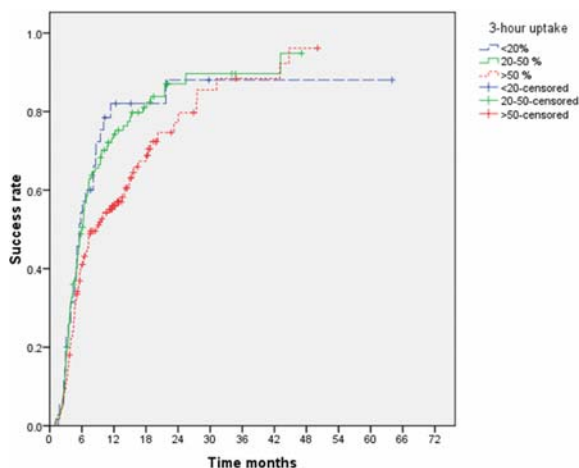
of recurrence after remission, and long-term ATD therapy is not recommended for toxic nodular goiter. Most thyroidectomies for hyperthyroidism are performed in patients with very large glands and severe compressive symptoms, usually with toxic adenoma or toxic multinodular goiter. Surgical complications include injured recurrent laryngeal nerve, hypothyroidism and hypoparathyroidism. Some patients show symptoms of hypocalcemia after surgery, and this could be caused



**Fig. 2** Comparison of success rate by the size of gland size (gm).



**Fig. 4** Comparison of success rate with the dose of I-131 (mCi).



**Fig. 3** Comparison of success rate with 3-hour radioiodine uptake.

by ischemia and /or damage to the parathyroid gland. If permanent hypoparathyroidism occurs, the patient requires lifelong replacement of calcium and vitamin D. Common indications for I-131 therapy are recurrent Grave's disease or medical therapy failure. There are various approaches that can be taken to determine the I-131 treatment dose for hyperthyroidism, and fixed dose or calculated dose are the two main methods. The former, typically 5 mCi (low dose), or 10 or 15 mCi (high dose) is the most commonly used and is an effective treatment for the majority of hyperthyroidism patients; however, some patients, for example those with very large thyroid gland or low thyroid uptake, stand a high risk of treatment failure.

In an earlier trial study<sup>(10)</sup>, the fixed dose of a

3-4 mCi for all hyperthyroidism patients was used with 525 cases. One-year follow-up results showed that 85.0% of the patients were cured after initial I-131 dose, while the remaining 15.0% received more than 1 dose. Most of the patients were treated with <10 mCi, and only 21.0% of the patients received more than 10 mCi. The average I-131 dose is 6mCi, and only 5 patients required more than 25 mCi before they were cured. In another study<sup>(15)</sup>, which was performed with 605 hyperthyroid patients who received radioactive iodine (I-131) of 3,4,5,6,8 and 10 mCi, the overall success rate at 1 year after treatment was 76.4%. There was no significant relationship between cure and age, sex, and 24-hr RAIU more than 30.0%, but there were an inverse relationship between hyperthyroidism cure and gland weight. The authors concluded that the optimal I-131 dose for cure of hyperthyroidism should begin at 10 mCi and be increased for unusual cases such as patients with huge thyroid gland.

The calculated dose method of I-131 therapy is generally based on the thyroid gland weight (gram) x 100-200  $\mu$ Ci/gram of thyroid gland divided by the percentage of radioiodine uptake at 24 hours (24-hr RAIU). This seems to be optimal for individual cases, but it is more complicated and costly. A previous retrospective study<sup>(16)</sup> used the calculated dose method with 27 hyperthyroid children (aged 7.2 to 19.8 years) who received radioactive iodine = 150  $\mu$ Ci/gram of thyroid tissue. After six months of treatment, 44.5% of patients were hyperthyroid, and 14.8% and 40.7% were euthyroid and hypothyroid respectively. The patients were divided into two groups based on the success of the treatment: cure (euthyroid and hypothyroid) and



treatment failure (hyperthyroid). No significant difference was found between age, sex, duration of anti-thyroid, 2- and 24-hour thyroid uptake or I-131 dose in the two groups.

Another randomized controlled study<sup>(8)</sup> using the calculated method based on thyroid gland and 24-hour RAIU, compared the outcome of I-131 treatment in two groups of hyperthyroidism patients who received 100 and 150  $\mu$ Ci of radioactive iodine (I-131). The first group of 76 patients received 100  $\mu$ Ci of I-131/gram of thyroid gland with a mean dose of 8.20 mCi. The second group of 74 patients received 150  $\mu$ Ci/g with a mean dose of 10.20 mCi. At six months and one year after treatment, the results showed that a high dose (150  $\mu$ Ci/g) was more effective than a low-dose regimen with success rates at one year after treatment of 70.0% and 52.0% respectively.

A prospective study<sup>(11)</sup> compared the low and high dose as well as fixed and calculated dose of I-131 in 97 hyperthyroidism patients with a single toxic thyroid nodule who had a mean age of 43.30 years (SD = 13.40) and mean 24-hour iodine uptake value of 48.7%. At 10 months after treatment, the patients in the calculated high dose group (6.66-7.4 Mbq/g) yielded higher cure rates than those of the other groups. There was no significant difference in cure rates between the fixed low-dose group (481 MBq) and the calculated low-dose group (333-370 MBq). The average treatment dose of I-131 in the calculated dose group was significantly lower than that of the fixed dose group.

I-131 therapy for hyperthyroidism is an effective treatment. Many studies have compared various treatment outcomes and related factors; success rates vary and are dependent on a number of factors. Generally, the factors that are known to affect the outcome include I-131 treatment dose, thyroid gland size, thyroid uptake and gland sensitivity. In this study, the dose of I-131 applied was based on thyroid gland weight estimated using physical examination, 100-200  $\mu$ Ci/g depending on 3-hr RAIU, and clinical findings. The mean (SD) I-131 dose was 14.40 (5.71) mCi. After I-131 therapy, the condition of these hyperthyroidism patients improved from a week to several months. Approximately 50-70 percent of the patients showed decreased thyroid gland size and thyroid function. Some patients' thyroid function returned to normal after 6-12 months, and this may have been due to late biological effects of radiation causing further damage and loss of thyroid tissue. The overall success rate within 1 year was 66.3%, and 35 (11.5%) of these patients were euthyroid. The median time of success was 6.47

months (5.61-7.32, 95%CI). There was significant correlation between success rate and gland size, 3-hr RAIU, I-131 dose and underlying cardiovascular disease. Patients with low 3-hr-RAIU (<20.0%) or with underlying cardiovascular disease showed a significantly higher success rate at 1 year after treatment than other groups, and this could be due to higher applied doses of I-131. There was no significant relationship between success rate and age, gender, BMI, diagnosis and pre-treatment of ATD therapy.

Four patients had transient hypothyroidism for 1, 1.5, 4 and 9 months, followed by relapsed hyperthyroid within 1 year. Hypothyroidism within the first 6-12 months after I-131 therapy might be a transient form of the disease; however, patients who had hypothyroidism after I-131 therapy for years would have permanent hypothyroidism and require lifelong L-thyroxine supplement.

Estimating thyroid gland size by physical examination is convenient but requires prior training and practice; furthermore, it is difficult to estimate the thyroid gland weight accurately when patients have very large glands. A few centers estimate gland size using approximately 1, 2, 3 times of reference normal thyroid gland (20 gm), and some clinics perform ultrasound measurement to obtain an accurate thyroid volume. The size of the thyroid gland has been shown to correlate with success rates, and patients with large glands stand a high risk of treatment failure. In the present study, 53 (17.4%) patients had large thyroid gland (>60 gm), and 19 of these were over 120 grams. They had a lower success rate at 1 year (42.0%) than other groups. As mentioned in many studies, 24-hr RAIU can be predicted with high reliability from earlier 2-4 hr RAIU<sup>(17,18)</sup> and can help to reduce the number of visits from two to a single one. Measurement of 3-hr RAIU for thyroid uptake activity is helpful in detecting very low thyroid uptake in patients who are at high risk of treatment failure and require higher treatment doses of I-131. Nevertheless, a rapid thyroidal iodine turnover rate of hyperthyroidism, which was the cause of treatment failure, would not be detected. It has been shown that high doses of I-131 treatment correlate with high success rates and incidence of hypothyroid. The success rate of doses between 5 and 10 mCi increased 3.5% per added millicuries<sup>(15)</sup>. The incidence of hypothyroidism rose to 50.0 percent in patients who received a high dose of I-131 at 1 year after treatment and to at least 25.0 percent of patients who received a low dose. However, although a low dose of I-131 treatment lowered the incidence of hypothyroidism in

the early period of post treatment, it could not reduce its occurrence in the later period. Finally, most patients develop hypothyroidism after I-131 therapy<sup>(19,20)</sup>; furthermore, Grave's disease might lead to hypothyroidism regardless of whether the radioiodine therapy or thyroidectomy are used. The incidence of hypothyroidism after surgical treatment is about 20-30 percent, which is lower than its occurrence after I-131 therapy.

The individual thyroid metabolism and gland sensitivity are known to be important factors affecting outcomes; unfortunately, there is currently no direct method of measuring them. Other factors reported to affect the treatment outcomes include age, gender, severity of hyperthyroid and history of ATD therapy. As outcomes are correlated to several aforementioned factors, no conclusion has been drawn as to the best method of determining the ideal I-131 treatment dose. Therefore, the method of determining the dose or finding out how to determine the ideal dose should be considered bearing these factors in mind together with compatibility with an individual patient, and the medical institute.

## Conclusion

Treatment success rate depends on both patient factors and I-131 dose selection. Generally, patients with large gland size or low uptake were at high risk of treatment failure. A high dose of I-131 treatment correlated with higher success rates and incidence of hypothyroid. In the present study, the mean (SD) I-131 treatment dose was 14.40 (5.71) mCi, the success rate within 1 year was 66.3%, and the median time of success was 6.47 months (5.61-7.32, 95% CI). The factors associated with success rates were I-131 dose ( $p = 0.014$ ), gland size ( $p = 0.044$ ), 3-hr thyroid uptake ( $p = 0.02$ ) and underlying disease ( $p = 0.014$ ). There was no significant relationship between success rates and age, gender, BMI, diagnosis and pre-treatment of ATD therapy.

## What is already known on this topic?

I-131 therapy for hyperthyroidism is an effective treatment.

Success rates vary depending on several factors.

## What this study adds?

Further data about success rates and related factors among hyperthyroidism patients who received I-131 therapy based on this protocol.

## Potential conflicts of interest

None.

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## อัตราการรักษาสำเร็จและปัจจัยที่มีความสัมพันธ์กับการรักษาสำเร็จในผู้ป่วยไทรอยด์เป็นพิษที่ได้รับการรักษาด้วยรังสีไอโอดีน (I-131)

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**ภูมิหลังและวัตถุประสงค์:** อัตราการรักษาสำเร็จในผู้ป่วยไทรอยด์เป็นพิษที่ได้รับการรักษาด้วยไอโอดีนกัมมันตรังสี ขึ้นอยู่กับหลายปัจจัยในโรงพยาบาลราชวิถี ปริมาณไอโอดีนกัมมันตรังสีสำหรับรักษาภาวะไทรอยด์เป็นพิษจะพิจารณาจากน้ำหนักต่อมไทรอยด์ ปัจจัยทางคลินิก และค่าการดูดซึมรังสีของต่อมไทรอยด์ที่ 3 ชั่วโมง (3-hrRAIU) จุดมุ่งหมาย ของการศึกษานี้ เพื่อประเมินอัตราการรักษาสำเร็จและปัจจัยที่มีความสัมพันธ์กับการรักษาสำเร็จในผู้ป่วยไทรอยด์ ที่ได้รับการรักษาด้วย ไอโอดีนกัมมันตรังสีตามวิธีการดังกล่าว

**วัสดุและวิธีการ:** การศึกษาย้อนหลังผู้ป่วย 305 คนที่ได้รับการรักษาไทรอยด์เป็นพิษ ด้วยรังสีไอโอดีนที่ภาควิชา เวชศาสตร์นิวเคลียร์ โรงพยาบาลราชวิถี กรุงเทพมหานคร ระหว่างมกราคม พ.ศ. 2553 ถึง ธันวาคม พ.ศ. 2557 โดยรวบรวมข้อมูลลักษณะส่วนบุคคล น้ำหนักต่อมไทรอยด์ (กรัม) ค่าการดูดซึมรังสีของต่อมไทรอยด์ที่ 3 ชั่วโมง และปริมาณรังสีไอโอดีนที่ได้รับ รวมถึงผลการรักษา โดยผลการรักษาสำเร็จคือ ผู้ป่วยอยู่ในภาวะไทรอยด์ทำงานปกติ (Euthyroidism) หรือไทรอยด์ทำงานน้อย (hypothyroidism) ใน 1 ปี

**ผลการศึกษา:** ผู้ป่วยไทรอยด์เป็นพิษทั้งหมด 305 คน ค่าเฉลี่ย (SD) ของ อายุ น้ำหนักต่อมไทรอยด์ ค่าการดูดซึมรังสี ของต่อมไทรอยด์ที่ 3 ชั่วโมง และปริมาณรังสีไอโอดีนที่ได้รับ เท่ากับ 44.17 (15.14) ปี 51.19 (31.95) กรัม 50.62 (24.36) % และ 14.40 (5.71) มิลลิวูรีตามลำดับ อัตราการรักษาสำเร็จภายใน 12 เดือนเท่ากับ 66.3% อัตราการรักษา สำเร็จมีความสัมพันธ์กับรังสีไอโอดีนที่ได้รับ ( $p = 0.014$ ) ขนาดต่อมไทรอยด์ ( $p = 0.044$ ) ค่าการดูดซึมรังสี ของต่อมไทรอยด์ที่ 3 ชั่วโมง ( $p = 0.02$ ) และโรคประจำตัว ( $p = 0.014$ )

**สรุป:** ปริมาณรังสีไอโอดีนที่ได้รับเฉลี่ย 14.40 มิลลิวูรี (SD = 5.71) อัตราการรักษาสำเร็จภายใน 12 เดือนเท่ากับ 66.3% การรักษาผู้ป่วยไทรอยด์เป็นพิษด้วย รังสีไอโอดีนเป็นการรักษาที่มีประสิทธิภาพ โดยอัตราการรักษาสำเร็จ ขึ้นอยู่กับทั้งปัจจัยของผู้ป่วยเองและปริมาณรังสีที่ได้รับ

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